INITIATING AND SUPPORTING CURRICULUM DELIVERY AND IMPLEMENTATION: REVIEW OF RELEVANT LITERATURE

by

HARVEY RESEARCH LTD.

Funded and Supported by

ALBERTA EDUCATION

September 1988

90-03574/

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ACKNOWLEDGMENTS

The author benefited greatly from the support provided by Mrs. Christina Andrews and other members of the Alberta Education Library staff. They provided excellent service in identifying and accessing information on the topics addressed in the review. Thanks are also extended to Carol and Lori of LaserTech for attending so cheerfully to the revisions required.

August, 1988

H.C. Rhodes

INTRODUCTION

Alberta Education has commissioned Harvey Research Ltd. to undertake an evaluation entitled a **Field Study to Determine Teacher and Student Needs Regarding Curriculum Documents and Resources**. The Terms of Reference for the study and the Research Proposal prepared in response indicate that the purpose of this study is to determine how effective the current mechanisms for delivery of curriculum are, and to identify means for improving curriculum delivery and implementation to better meet the needs of teachers.

The information collection procedures to be used by Harvey Research Ltd. are as follows:

- face-to-face interviews with a selection of teachers and other school staff from across the province;
- face-to-face or telephone interviews with a cross-section of staff involved in curriculum delivery at the provincial, regional and school district levels;
- consultant analysis of issues related to selected study questions;
- a literature review.

The literature review is the preliminary information collection activity of the investigation team and, although modest in scope and comprehensiveness (six consultant-days were allotted to the task), it was felt that several benefits would be realized:

1. the conclusions and generalizations generated from the research and experience elsewhere would augment and supplement the recent reviews on curriculum delivery/implementation (Alberta Education, 1988) and inservice education of teachers (Patterson, 1986) completed by Alberta Education;
2. topics from this source might contribute ideas for inclusion in questions developed for the upcoming interviews; and
3. some of the information gathered would contribute to answering questions generated to guide the study.

Topic areas receiving emphasis in this review are educational change and diffusion/adoption/implementation of innovations, implementation of curriculum, and inservice education of teachers. These topics are obviously intertwined and overlapping. The educational changes presented to teachers can take the form of new curricula, revisions to existing curricula or simply placement in a strange teaching assignment. These changes may require alteration in any or all of teaching behaviour, teachers' attitudes and beliefs, and the knowledge/skill/attitudes reflected in the

student outcomes' objectives for the program. The changes cannot be said to have occurred until they are implemented (actually used and incorporated in instruction) in the classroom. Inservice education arrangements are intended to help teachers and others cope with change and to succeed with one or more of organization for instruction, teaching behaviour, teachers' attitudes and beliefs, and program content. The paramount goal for **teacher inservice** is **implementation** of the desired change(s).

Other sources of support for implementing change in curricula receive relatively less attention in this review. The channels and types of communication used to support change efforts by program implementers are important contributors. They may take the following forms: orientation seminars; print documents such as programs of studies, curriculum guides and teachers' manuals; and multi-media kits, among others. These supporting mechanisms will be closely examined in the interviews conducted during the upcoming field study. However, since there appears to be almost a dearth of research literature on these topics, only brief mentions appear throughout the review. For example, the OISE Press publication by Fullan (1982) entitled **The Meaning of Educational Change** reported about the usefulness and frequency of use of curriculum guides revealed by two provincial program evaluations conducted in British Columbia: two-thirds of the elementary school teachers and one-half of the secondary school teachers had not consulted the Curriculum Guide (Reading) in the previous six months; only 17% and 26% of the elementary and secondary school teachers respectively reported that the Guide had a significant impact on their teaching. Similar results were found in the provincial program evaluation in Social Studies where almost 50% of the teachers responded at the low end of the helpfulness scale in rating the guide on "helpful teaching suggestions" (p. 244). Fullan (1982) footnotes the comment that "There are no comparable data available from other provinces . . ." (p. 244). A more positive finding is reported later (Lee and Wong, 1985) based on a questionnaire survey of Manitoba teachers. Ninety percent of elementary and secondary school teachers found the respective guides to be useful, easy to understand, well organized, and easily modifiable. **The general context in which delivery and implementation of curricula occur** receives attention by means of the literature review. More restricted and specific foci on the print material such as curriculum guides provide the organizing framework for the field study interviews. As a consequence, the general factors identified by the review should complement and extend the information gathered via the interviews. This augmentation is consistent with notions communicated by Fullan (1982) in his chapter on implementation of curricula by provincial governments in Canada:

> The first matter that should be recognized is that curriculum guidelines are not (and are not intended to be) the actual curriculum materials to be used. Depending on the subject area and the province, they can go some distance in providing sources of ideas and activities but they are not the intact curriculum for use. And many teachers do

not use them (p. 244). . . . The second aspect of the role of provincial ministries concerns how they go about introducing and following through on new and revised guidelines. . . . Even if the orientation goes well, the real implementation difficulties lie beyond the introduction (p. 245).

CHANGE AND DIFFUSION/ADOPTION/ IMPLEMENTATION OF INNOVATIONS IN EDUCATION

This section of the review is framed largely within the conceptual schemes and constructs about change processes formulated by Rogers (1962; 1983) and Rogers and Shoemaker (1971). During the twenty-one year interval between the first and third editions of these publications the number of diffusion publications increased eight times. Those which were empirically based research reports increased from 1200 in 1971 to 2297 in 1983. Many were cast within the paradigms formulated by Rogers.

The study of diffusion and adoption of innovations in North America was given its greatest impetus by rural sociologists in their study of adoption by farmers of agricultural extension practices. This was their dominant research tradition until the mid-1960's. During this period only Dr. Paul Mort and his students at Columbia University used this tradition for educational studies. However, after this date and up until the mid-1970's there was a rapid expansion of education studies following this paradigm. At the time of the publication of Roger's (1983) third edition about 11 percent of all diffusion publications were on education topics. Other disciplines represented in significant proportions were Rural Sociology (26%), Communication (12%), Marketing and Business (10%), General Sociology (9%), and Public Health and Medical Sociology (7%) (Rogers, 1983, Table 2-2). The last named along with Anthropology are well represented in publications in this tradition completed in developing countries -- 47% and 60% respectively. As a consequence many of the generalizations and principles about change processes used later in this section have been generated by several disciplines in various cultures and could be characterized as multi-disciplinary and cross-cultural in development and application.

Rogers (1983 pp. xvi-xviii) traces the modification to the original formulations used to describe change. Recent additions included these:

1. The view of the diffusion process in a wider scope and as one part of a larger process which begins with a perceived problem or need, through research and development on a possible solution, the decision by a change agency that this innovation should be diffused and then its diffusion (leading to certain consequences).

2. Attention to **implementation** (a study of consequences of an innovation) as a dependent variable. Much of the research in this area has been terminated at the **adoption** stage (the point at which a decision is made to use and implement a new idea).

Fortunately, Fullan and colleagues at OISE have contributed substantially to the literature on implementation (Fullan, 1972, 1977, 1982, 1985, 1986; Fullan and Pomfret 1977; Fullan and Park, 1981; Leithwood 1976, 1982, Leithwood, et al. 1976; Leithwood and Montgomery 1980; Miller and Seller, 1985).

3. Attention to a convergence model of communication in which participants create and share information with one another to reach a mutual understanding. This supplements the original model comprised of one-way linear communication e.g., change agent to potential adopter. The convergence model is reflected in the Levels of Use Scale (LoU) used to measure the extent to which a program has been implemented (Hall et al., 1975). One dimension of the LoU Scale is Sharing and an important component of this is discussion with colleagues and superordinates. Problems associated with the ethics of planned changes appear to be ameliorated when a convergence mode of communication is incorporated as a strategy.

The Diffusion Model Applied to Facilitating Change in Education

The elements which comprise the Diffusion Model (Rogers, 1983) provide a useful organizing framework for a discussion about planning and implementing change in education. Guba (1968) used an earlier version of the Model to outline its applicability to strategies and action plans needed by diffusers (change agents) in successfully diffusing innovative ideas and practices in education leading to adoption. The following represents an update based on the attributes of the 1983 Model and more recent research. Included in this empirical support are results from the research on implementation of education programs and inservice education of teachers.

Overview of Selected Elements in the Diffusion Model

To provide a panoramic overview of important elements which comprise the Diffusion Model skeletal outlines of its various facets are enumerated in the section below. This listing is supplemented by the visual representation of the model on page 7. Elaborations in the form of

definitions, descriptions, documentation and the implications for those planning and facilitating change in education are deferred to succeeding sections.

A. **Diffusion** is a special type of communication concerned with the spread of messages that are new ideas. **The main elements** in the diffusion of new ideas are: 1) an **innovation**, 2) which is **communicated** through certain **channels**, 3) **over time**, and 4) among members of a **social system**.

B. **The rate and/or extent of adoption/implementation** of innovations are influenced by the following factors:

1. **The characteristics of an innovation as perceived by members of a social system**: i.e.,
   - i) relative advantage
   - ii) compatibility
   - iii) complexity
   - iv) trialability, and
   - v) observability.
2. **Communication Channels**
   - i) Mass Media
   - ii) Interpersonal
3. **The innovation-decision process leading to acceptance or rejection**
   - i) knowledge
   - ii) persuasion
   - iii) decision
   - iv) implementation, and
   - v) confirmation
4. **Innovativeness or adopter categories**
   - i) innovators
   - ii) early adopters
   - iii) early majority
   - iv) late majority, and
   - v) laggards
5. **Change agents and promotion efforts.**

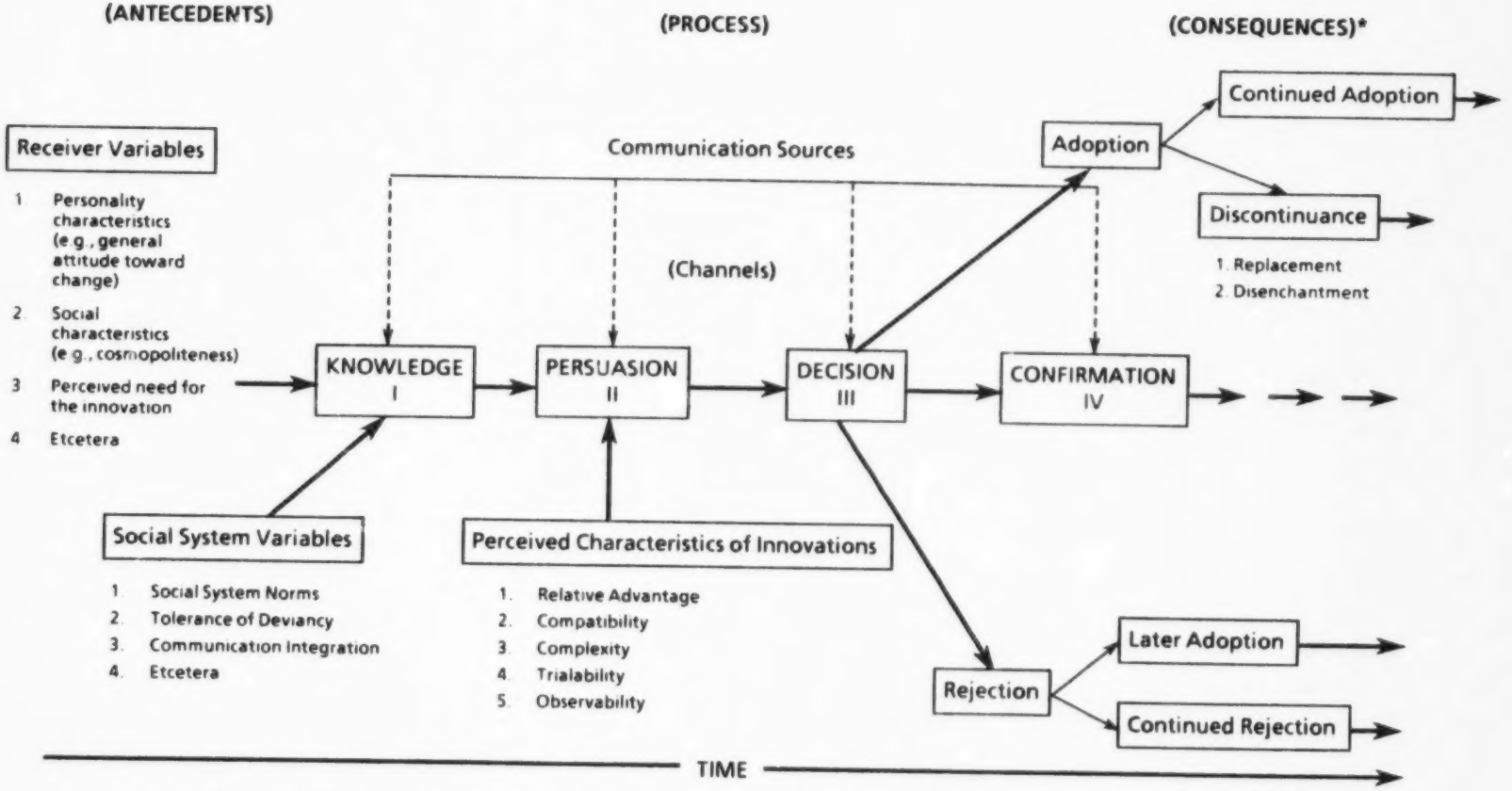
C. **Four Types of Innovation-decisions**

1. optional
2. collective
3. authority, and
4. contingent (a sequential combination of two or more of the above).

D. **Consequences.**

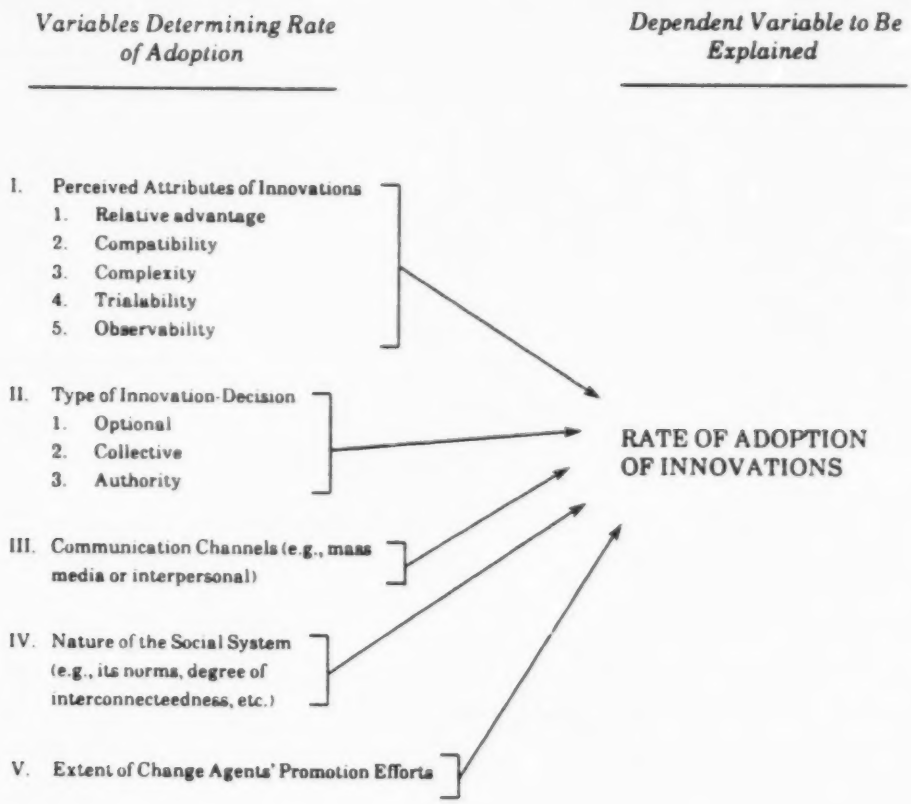
Paradigm of the Innovation - Decision Process

(Figure 3-1 from Rogers and Shoemaker, 1971, p. 102)



*For the sake of simplicity the authors have not shown the consequences of the innovation in this paradigm but only the consequences of the process.

Variables Determining Rate of Adoption
(Figure 6.1 from Rogers, 1983, p. 233).


Variables Determining Rate of Adoption
Dependent Variable to Be Explained
I. Perceived Attributes of Innovations
1. Relative advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability
II. Type of Innovation-Decision
1. Optional
2. Collective
3. Authority
III. Communication Channels (e.g., mass media or interpersonal)
IV. Nature of the Social System (e.g., its norms, degree of interconnecteedness, etc.)
V. Extent of Change Agents' Promotion Efforts
RATE OF ADOPTION OF INNOVATIONS

Attributes of Innovations and Their Rate of Adoption

The five attributes of innovations (as perceived by potential adopters) which influence innovation-decisions and rates of adoption are 1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, and 5) observability (Rogers, 1983, Chapter 6). Each of these will be defined and some implications for planning and facilitating change in education presented.

Relative Advantage

Relative advantage is the degree to which an innovation is perceived to be better than the idea it supersedes e.g., Is this new school program or curriculum revision better than the existing one?

The generalization that the perceived relative advantage of an innovation is related to its rate of adoption (Rogers 1983, p. 239) is supported by 67 percent (29/43) of the research studies examining this attribute. Education studies by Clinton (1973) who surveyed 383 Canadian elementary teachers, Holloway (1977) using 209 U.S. teacher respondents, and Hahn (1974) supported this conclusion.

There appears to be frequent confusion between the attributes Relative Advantage and Compatibility in education studies (Holloway, 1977; Hahn, 1974). Even Rogers (1983) contributes to this confusion in his discussion of compatibility in relation to Hahn's results:

> Obviously, however, if a new idea were completely congruent with existing practice, there would be no innovation, at least in the mind of the potential adopters. . . . Just such a case is reported by Hahn (1974) who found that the U.S. Social Studies teachers he studied rejected educational innovations that were too similar to existing practices. If an innovation is too similar, it appears to offer no advantage over the status quo (pp. 224-225).

Compatibility

Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.

The generalization that the compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption is also supported by 67 percent of the studies (18/27). Educators involved in planning and fostering change need to heed the advice of Willower (1963): "If changes are to be initiated into school systems, there should be awareness of the

kinds of resistance that are likely to occur". However, those responsible for implementing change in the face of opposition can take heart from the experience elsewhere reported in the literature:

1. Relative to values as reflected by racial prejudice --

   Watson and Glaser (1965) indicated that one set of findings from studies conducted by the Human Interaction Institute was that instituting change in the face of opposition is frequently followed by acceptance. Examples included racial integration in sports, the military and industry.

2. Relative to values, beliefs and attitudes generally --

   The studies conducted within the rubric of Festinger's (1957) theory of cognitive dissonance have indicated that when a marked discrepancy is felt between behaviour or practice (that an individual may perhaps be obliged to perform) and a person's affective orientation, then beliefs/attitudes/values may be altered by the individual in order to reduce the annoyance associated with the discrepancy.

3. Relative to mandated curriculum changes --

   Orgren (1974; 1977) has documented that teaching behaviours may be altered to conform to the mandates of new secondary school science curricula (1974) and that changes are long term (1977).

4. Relative to resistance due to incompatibility with past experience i.e., due to lack of skills --

   Brickell (1961) in reporting the results of a comprehensive survey of educational change in New York State offered these conclusions:

   > New instructional programs can be successfully introduced despite initial apathy or even opposition on the part of a number of teachers. . . . Feelings of inadequacy should be distinguished from outright resistance to change . . . More new programs have been destroyed by inability than by reluctance . . . The most successful innovations are those which are accomplished by the most elaborate help to teachers as they begin to provide the new instruction (pp. 25-26).

These last points warrant further mention. Brickell found few situations where teachers sabotaged change after it was initiated. He found many situations where the teacher had not been taught to handle the new approach. He emphasized that it became vividly clear during the survey that **the key to successful innovation is substantial, continuing assistance to teachers**.

Complexity

Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use.

The relevant generalization in that the complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption. Relatively less support is provided by research: 56 percent (9/16) of the studies support the generalization. The Brickell (1961) admonition about substantial, continuing support for teachers has relevance, particularly if the modifications to curricula are viewed as difficult to implement.

Perceived complexity is associated with the clarity of curriculum guides and associated documents. Enhancing clarity is an obvious means for reducing complexity. Clarity is routinely mentioned in the literature on curriculum implementation e.g., Miller and Seller (1975) p. 278, Lee and Wong (1985a) p. 15; Fullan (1972) p. 8, Fullan and Pomfret (1977) p. 379; Fullan (1982) p. 56; and Wade, 1984.

Complexity as a significant attribute of educational innovations has been studied by Clinton (1973), Hahn 1974, Holloway (1977), and Kohl (1966). The latter found that complexity was a concern of superintendents at the interest stage of the adoption process.

Trialability

Trialability is the degree to which an innovation may be experimented with on a limited basis. **The associated generalization is that the trialability of an innovation, as perceived by members of a social system, is positively related to rate of adoption.** Sixty-nine percent of the research studies (9/13) results support this generalization including those of Holloway (1977).

Successive approximations have been demonstrated as effective training ploys in developing new teaching skills (Hahn, 1969) as have simulated practice conditions (Joyce and Showers, 1980). Both techniques permit teachers to taste the loaf one slice at a time. In any event, many innovations in education may actually only be partially adopted and implemented. Rogers (1983) has noted that "A national survey of schools adopting educational innovations promoted by the National Diffusion Network, a decentralized diffusion system, found that 56 percent of the adopters implemented only selected aspects of an innovation . . ." (p. 177). Perhaps it was those aspects of the innovations which could most readily be experimented with that were finally adopted.

Observability

Observability is the degree to which the **results** of an innovation are visible to others. Some are more easily observed and described than others. The ease of communication of results from implementing the innovation is related to its rate of adoption. **The pertinent generalization is that the perceived observability of an innovation is positively related to its rate of adoption.** Seventy-eight percent of nine studies (7/9) confirmed this relationship including three surveys of teacher perception (Clinton, 1973; Hahn, 1974; Holloway, 1977).

The implications for planners and coordinators of curriculum changes are related to clarity and communicability. These have been mentioned in connection with facilitating implementation by enhancing clarity in the section concerning Complexity.

Degree of Interconnectedness in the Social System e.g., School or District

Interconnectedness is an attribute of the unit(s) asked to adopt an innovation, not a characteristic of the innovation itself. It refers to the degree to which the units in a social system are linked by interpersonal networks. The activation of peer networks creates a cumulatively increasing degree of influence upon the individual to adopt that is called the **diffusion effect**.

The degree of interconnectedness in a social system is positively related to the rate of adoption of innovations.

Rogers (1983, p. 240) has noted that when only 20 or 30 percent of the units (e.g., individuals or schools) have awareness knowledge of the innovation there is very little adoption. However, once this threshold is reached further increases in awareness knowledge lead to increases in adoption. Presumably awareness by about one-third of the potential adopters is needed to create the critical mass of peer pressure required to facilitate and accelerate passage through the decision-making sequence.

A frequently cited curriculum study which focused on interpersonal communication networks is one reported by Carlson (1965). The study documented the rapid diffusion and adoption of modern math in Allegheny County Pennsylvania as due to an informal friendship group of six school superintendents. Once this clique adopted the new curriculum it then spread rapidly over the remainder of the county. A single innovative superintendent, the sociometric isolate who had no interpersonal communication with other superintendents, adopted the curriculum in 1958. However, not until the opinion leaders and the closely-knit friendship group decided to adopt did the innovation

spread. Each member of the early adopter group had other interpersonal communication contacts and these appeared to be significant diffusion channels. The number of adopters increased from one in 1958 to five in 1959, fifteen by 1960, twenty-seven by 1961, thirty-five in 1962, and thirty-eight by the end of 1963.

The volume by House (1974) documents very convincingly the significant impact of personal contacts, geographic proximity, and communication networks among peers on influencing innovative decision-making. House reminds the reader that the teacher's professional information is relatively restricted (pp. 69-73).

The implication for those planning and managing change in education is that effective models need to provide for personal contacts and interpersonal communication which involve program implementers (who are usually teachers). Before many of the latter adopt a change in curriculum, the personal touch seems needed as well as time and opportunity for dialogue and interaction with peers.

Much of the foregoing discussion pertains to communication and communication channels used to disseminate information about new ideas and practices. It seems timely, therefore, to address this topic briefly at this point. Communication receives attention within the next section about the steps through which decision-makers pass before adopting and implementing an innovation. It is not treated as a separate topic since, as a means to an end, it is an integral part of the decision-making sequence.

The Innovation-Decision Process

Definition

The innovative-decision process, compared to other types of decision-making, is different in that it deals with uncertainty about a **new** alternative. It refers to the sequence of stages through which an individual (or other decision-making unit) passes from first knowledge of the innovation, to forming an attitude toward it, to a decision to adopt or reject, to implementation of the new idea, and to a confirmation of this decision (Rogers, 1983, p. 163).

Stages in the Innovation-Decision Process

Five stages were proposed by Rogers (1983) to describe the decision-making sequence experienced by adopting units (individuals or organizations) with respect to innovations:

1. **Knowledge** - the adopter is exposed to the innovation's existence and gains some understanding of how it functions.

   Curriculum bulletins or newsletters, conferences, teachers' conventions, staff meetings and the mass media are examples of sources from which the adopter is made aware of the innovation and may develop an interest and preliminary understanding about it. Such mass media type channels of communication are relatively more important (than interpersonal channels) at the knowledge stage.

   The generalizations derived from the results of research are that **mass media and cosmopolite channels are relatively more important at the knowledge stage** (90 percent and 86 percent support respectively) **and interpersonal channels and localite channels are relatively more important at the persuasion stage** (90 percent and 86 percent are the respective proportions supported by the research).

2. **Persuasion** - the individual (or other decision-making unit) forms a favourable or unfavourable attitude toward the innovation.

   Since interpersonal and localite channels of communication exert the most persuasive influence on attitudes, activities such as teacher/administrator intervisitations, on-site observation of new programs, demonstrations and discussions, and personal dialogues with peers (preferably those who have experienced the innovation) seem most efficacious. It follows that these activities are most easily planned and coordinated at the local (school or district) levels. However, a provincial department might appropriately use such techniques in

facilitating passage through this stage by representatives, opinion leaders and status leaders from school jurisdictions and schools. The expectation would be that those selected would return home to communicate knowledge and exert persuasion using appropriate channels.

3. **Decision** - the individual (or other decision-making unit) engages in activities that lead to a choice to adopt or reject the innovation.

The earlier studies concerning change and the diffusion of innovations terminated at the adoption stage. Concerning adoption, a large body of research has been conducted about the characteristics of adopters. Rogers' (1983, p. 260-61) footnotes that some 1800 empirical publications have dealt with the topic by examining adopter characteristics which are related to innovativeness. Selections from these categories of attributes and the proportions of studies which support **the generalization that the characteristics of adopters which are positively related to innovativeness are as follows:**

	%
Socioeconomic	
Education	**74**
Higher social status	**68**
Upward social mobility	**100**
Personality	
Ability to deal with abstractions	**63**
Rationality	**79**
Intelligence	**100**
More favourable attitude toward change	**75**
More favourable attitude toward education	**81**
More favourable attitude toward science	**74**
Achievement motivation	**61**
Higher aspirations	**74**
Ability to cope with uncertainty	**73**
Communication Behaviour	
Interconnectedness with the social system	**100**
Social participation	**73**
Cosmopoliteness	**76**
Change agent contact	**87**
Mass media exposure	**69**
Exposure to interpersonal channels	**77**
More active information seeking	**86**
Knowledge of innovations	**76**
Opinion leadership	**76**

As will be noted in the upcoming section on Adopter Categories, knowledge about the nature of the adopter(s) aids in selecting appropriate diffusion strategies. Attending to

individual differences among adopters is in order. The characteristics enumerated above describe earlier adopters who might well be assigned priority for attention by change agents. **Earlier knowers about innovations have similar characteristics to the sets listed above which correlate with innovativeness.**

4. **Implementation** - the adopting unit (individual or organization) puts an innovation into use.

The section on implementation will be discussed at some length later in this review where the views of educators will appear. Investigators of change processes have discovered somewhat belatedly that one cannot assume that implementation will occur as a consequence of a decision to adopt. The study of change in organizational settings has been particularly revealing in this regard (Rogers, 1983, Chapter 10). In organizations a number of people are usually involved in the innovation-decision process, and the implementers are often a different set of people.

This distinction between decision-makers and implementers describes the realities associated with many curriculum changes in education. A provincial department may mandate a change which compels the school jurisdiction, school and teacher to decide to adopt. A number of consequences to this action may result:

i) A very active search for additional information and resources by implementers takes place. It is at this point that substantial, continuing technical support should be provided since anxieties, frustration, uncertainty and equivocal feelings are at peak levels.

ii) Partial implementation may take place. As noted previously the National Diffusion Network survey of U.S. schools found that 56 percent of adopters implemented only selected aspects of an innovation (Rogers, 1983, p. 177). In education a partial implementation is more likely to occur with respect to teaching methods (e.g., enquiry approaches, value clarification, problem-solving, and individualization) than for changes in cognitive content (student outcome objectives) or in organization. On this topic Kimpston (1985) in his review has stated:

> . . . organizational innovations, which are usually clearly stated, handed down from an unquestioned central authority, and for which the teacher will be held accountable, will be implemented with relatively few negative attitudes on the part of implementers, but pedagogical innovations, usually not so clearly stated and demanding that teachers change their own behaviour, have less chance for 'across the board' implementation. As several researchers have found, teachers tend to implement more effectively curricula which allow them to use instructional strategies with which they are already familiar (p. 186).

The last point made by Kimpston serves as a reminder that the compatibility of the required change (its congruency with past experience and current skill levels) is a very significant factor associated with implementation. It follows that if marked changes in teaching behaviour are sought, substantially increased care, time and resources are required to facilitate implementation than would be required for changes in content or organization.

iii) Changes to the curriculum may be made by implementers.

The National Diffusion Network survey of schools revealed that 20 percent of the adoptions resulted in large changes to the innovation. The literature on implementation reveals that varying degrees of changes are the norm as teachers are prone to adjust the curriculum to their own teaching style and/or the content to reflect their own predispositions or the needs of their pupils. For example, Lee and Wong (1985b) found in their case studies of curriculum implementation in Manitoba that reinventions occurred:

> At the teacher level, however, part of implementing curricula is the modification to suit the teacher's own style, the needs of particular student populations and/or different classroom organization (e.g., multi-graded setting). This development is, in fact, necessary at the classroom level if successful implementation is to be achieved. Teachers, however, are often unsure if this is a legitimate part of "using" or "implementing" the curriculum (p. 11).

Rogers (1985, pp. 176-7) credits two educators (Charters and Pelligrin, 1972) with launching a focus on "re-invention" of innovations during implementation. Because these investigators focused on implementation **processes**, and used observation, they discovered that "differentiated staffing" (the target innovation) was merely an empty abstraction to some participants and to others it was shaped markedly differently. Rogers notes that whether re-invention is good or bad depends on one's point of view. Diffusion agents tend to take a jaundiced view of changes. On the other hand adopters generally think that re-invention is good. Indeed, occasionally changes result in needed improvements when one considers local conditions.

Berman and McLaughlin (1978) in reporting on the successes and failures of the educational innovations examined in the RAND Corporation studies noted that local changes were significantly related to survival of the innovation. In the 400 projects studied, change and adaptation of the innovation occurred frequently and, when local

modifications were made, the probability was enhanced that the innovation would be retained.

Any assumptions may be tenuous that mandated changes in curriculum have been implemented, particularly those that require marked changes in pedagogical practices. One implication for those responsible for managing and facilitating the change is that close scrutiny of the implementation is required if fidelity of implementation has priority. Kimpston (1985), Leinhard (1976), Leithwood (1982), Leithwood and Montgomery (1980), Orgren (1974), Smorodin (1984) and Welch and Wilson (1977) offer measurement scales and illustrations as aids in planning the monitoring of implementation. Revicki and others (1981) have reviewed and critiqued procedures for measuring program implementation.

iv) **Re-invention occurs at the implementation stage for certain innovations and for certain adopters** (100% support). Rogers (1983, p. 178) offers this generalization, based on the research on implementation. Applied to education some schools and districts, for example, may have a propensity to make changes. A survey of U.S. school districts (Martin and others, 1987) revealed that most respondents prefer home grown curricula developed by local committees. The Havelock (1974) survey revealed that local authorship credit was frequently assigned to innovations that were in fact developed elsewhere. Apparently local adaptation of curricula and re-invention are to be expected and central planners need to accommodate to this reality. Delegating development of teaching procedures to local jurisdictions is one such accommodation; outcome objectives may be prescribed centrally but the means for achieving these may be a local prerogative. Pride in local ownership is a factor which prompts modifications, perhaps in minor and cosmetic ways.

Other reasons for re-invention are listed by Rogers (1983) as follows:

- Innovations that are relatively more complex and difficult to understand are more likely to be re-invented.
- An innovation that is a general concept or that is a tool (like a computer) with many possible applications is more likely to be re-invented.
- Reinvention is more likely to occur with innovations implemented to solve a wide range of problems.
- Decentralized diffusion systems may encourage clients to re-invent new ideas (School district central office staff, who operate as gatekeepers to curriculum change, may inject their own modifications and encourage adaptations by the school).

5. **Confirmation** - The individual (or other decision-making unit) seeks reinforcement for an innovation-decision already made.

Confirmation is the final stage in the innovation-decision sequence. After implementation a decision may be taken to discontinue the innovation and 1) replace with an alternative, or 2) reject it entirely. Apparently later adopters are more likely to discontinue innovations than are earlier adopters.

Reinforcement should be provided as one of the follow-up activities by change agents to help maintain and sustain the change. Feedback to teachers, for example, is a powerful determinant concerning whether or not a practice will be maintained (Hoehn, 1969; Tuckman and others, 1969; Lippit, 1969; Seller, 1987; Lawrence, 1981; and Joyce and Showers, 1980). To be effective, feedback should be immediate and direct (Chirnside, 1984; Bridges, 1985) and should be supplemented with expert consultation (Cohen, 1980; Manatt, 1982; Murray, 1980).

Innovativeness and Adopter Categories

Adopter categories are the classification of members of a social system on the basis of **innovativeness**, the degree to which an individual or other unit of adoption is earlier in adopting new ideas than other members of a system (Rogers, 1983, Chapter 7).

The adopter categories formulated by Rogers are well known among educators and have been useful in matching communication and professional development approaches according to type. The adopter categories have been assigned the following labels (relative proportions of the population belonging to each are noted parenthentically):

- **Innovators** - venturesome, frequently isolates (2.5%)
- **Early adopters** - respectable (13.5%)
- **Early majority** - deliberate (34%)
- **Late majority** - skeptical (34%)
- **Laggards** - traditional (16%)

As noted in the section on innovation-decision processes innovators and early adopters differ from later adopters in **personality variables** (e.g., more favourable attitudes toward change, education and science; greater ability to cope with uncertainty and risk, etc.), **and communication behaviour** (e.g., more highly interconnected in the social system and more likely to belong to highly

interconnected systems, more cosmopolite, with greater exposure to both mass-media and interpersonal communication channels, etc.).

The implications for change agents are that what is known about adopters and relative rates of adoption should provide guidance for diffusion strategies. For example, as recorded in the section on innovation-decision processes, later adopting individuals are influenced mainly by interpersonal contacts and interpersonal channels of communication since they attach greatest credibility to the subjective experiences of their peers. Accordingly, facilitating change with later adopters is best left to change efforts administered locally.

Guba (1968), during his tenure as Director of the National Institute for the Study of Educational Change, provided comprehensive and compressed sets of suggestions for attending to individual differences among potential adopters in fashioning diffusion strategies. He lists seven assumptions concerning this and suggests diffusion techniques for each:

Assumptions concerning the nature of the adopter

The adopter may be viewed as a

1. **Rational entity** who can be **convinced** on the basis of hard data and logical argument e.g., program evaluation results;
2. **Untrained entity** who can be **taught** how to perform in relation to the innovation e.g., tell, show, help, involve, intervene;
3. **Psychological entity** who can be **persuaded** e.g., self-actualization devices;
4. **Economic entity** who can be **compensated or deprived** e.g., withdrawal of funds;
5. **Political entity** who can be **influenced;**
6. **Member of a bureaucracy** who can be **compelled;** and
7. **Member of a profession** who can be **professional obligated** e.g., a value approach on moral commitments (what's good for the kids).

Assumptions concerning the end state in which one wishes to leave the adopter.

In Guba's (1968) opinion the end state frequently does not receive the attention which is warranted:

> What is it that the practitioner should be able to do, think, or to feel as a result of having been exposed to the innovative strategy? Is he to be better trained? More skillful? More knowledgeable? More open? It seems particularly ironic that this situation about end states should be found in the field of education, which is so generally characterized by a concern about behavioural outcomes and objectives. If we applied a little of our usual logic about specifying expected goals, this difficulty might be largely overcome (p. 294).

Opinion Leaders

Another category of adopter is the group labelled as opinion leaders. "Opinion leadership is the degree to which an individual is able to influence informally other individuals' attitudes or overt behaviour in a desired way with relative frequency" (Rogers, 1983, p. 307). Since opinion leaders play an important role in activating diffusion networks, attempts to secure their acceptance of any innovation is crucial and prerequisite to widespread adoption among their followers.

According to Rogers the research has provided support for the hypothesis that communication messages flow from a source, via mass media type channels, to opinion leaders, who in turn pass them on to followers. "This two-step flow model challenged the 'hypodermic needle' model which hypothesized that mass-media approaches had direct, immediate, and powerful effects on a mass audience, which was viewed as a body of disconnected individuals connected to the mass media but not to each other" (Rogers, 1983, p. 310).

The implication for change agents in education is that opinion leaders in districts and schools need to be contacted and influenced as a means of influencing the main group of adopters. It is noteworthy that one generalization from the research is that **opinion leaders conform more closely to a system's norms than do their followers. When a social system's norms favour change, opinion leaders are more innovative, but when the norms do not favour change, opinion leaders are not especially innovative.** Curriculum planners in education have long recognized that differences in attitudes about change exist among school systems and schools as well as individuals. If resources and time are limited, opinion leaders in innovative systems are priority targets for attention.

Change Agents and Promotion Efforts

A number of generalizations have been generated from the research relative to change agents' successes and contacts.

Change agents' success is positively related to (proportions of studies supporting recorded in brackets):

- **the extent to which he or she works through opinion leaders** (100%)
- **extent of effort in contacting clients** (84%)

- **client orientation, rather than change agency orientation** (100%). This supports the admonition that local needs and conditions need to be considered in introducing change (Further support appears next)
- **the degree to which the diffusion program is compatible with clients' needs.**

Types of Innovation - Decisions

The final aspect of the Diffusion Model presented for discussion is the type of decision made relative to any innovation. The four types have been described by Rogers (1983) as follows:

1. **Optional** - choices to adopt or reject made by an individual independent of the decisions of other members of the system.

   Much of the early literature about change processes was largely confined to situations involving individuals with freedom and autonomy to make independent decisions. It is clear that classroom teachers are delimited with respect to optional decisions if the innovation (e.g., change in curriculum) is mandated. They make optional decisions in areas over which they have control and where they may not be held accountable. Often these areas are the pedagogical procedures employed i.e., during implementation in the classroom.

2. **Collective** - choices to adopt or reject that are made by concensus among members of a group.

   A longer time span is required for collective decisions. However, the innovations decided upon by this approach tend to be more enduring.

   Collective decision-making is associated with group activities involving a number of teachers. Involving teachers in the design and development of new curriculum is thought to hasten adoption of the change and to increase the chances that it will endure. However, Fullan (1982) has pointed out in this regard that "as far as most teachers were concerned, when the change was produced by fellow teachers it was just as much **externally experienced** as if it had come from the university or the government" (p. 113). Fullan argues that personal participation is often erroneously assumed:

   > One of the great mistakes in North America in the late 1960's and 1970's was the naive assumption that involving **some** teachers on curriculum committees or in program development would facilitate acceptance by **other** teachers. Of course it was such an automatic assumption that people did not use the words "some" and "others". It was just assumed that "teachers" were involved because "teachers" were on major committees or project teams. Well, they were not involved, as the vast majority of classroom teachers know. Once again

there was a failure to distinguish between "the change" and "the change process" (p. 113).

3. **Authority** - choices to adopt or reject an innovation that are made by relatively few individuals in a system who possess power, status or technical expertise.

Authority innovation - decisions are forced upon an individual by an entity or someone in a superordinate power position. Examples are provincially mandated curriculum changes. The comments and references recorded in the section on Attributes of Innovations (Compatibility) are applicable here when widespread resistance is anticipated. The conclusions of Watson and Glaser (1965), Orgren (1974, 1977) and Brickell (1961) that mandated changes may be implemented successfully are heartening.

Rogers and Shoemaker (1971) have noted that "One of the distinctive aspects of educational diffusion is that it often occurs within bureaucratic structures. Many more of the innovative-decisions are authority or collective decisions rather than optional innovation-decisions . . .". Decisions to adopt curriculum changes in education are frequently of these types. However, decisions related to classroom implementation of pedagogical procedures are mainly of the optional kind which are made by individual classroom teachers.

4. **Contingent innovation-decisions** are choices to adopt or reject that can be made only after a prior innovation-decision.

An example from education is the freedom to implement an innovation only after approval has been obtained from a level above that of the initiator: a superintendent, school board or provincial department. Pratt (1980) offers insightful advice to school-based innovators about how to obtain approval. He notes that much significant change within classrooms can be carried out by individual teachers on their own initiative and that such curriculum changes have a greater chance of survival than those affecting other teachers and programs. He continues as follows:

> It is sound practice - not to seek approval unless it is required. However, if the change involves a departure from official policy, needs special resources, or is to be diffused beyond the initiating unit, experience suggests that individual teacher effort, however heroic, will not achieve much without substantial and continuous support from the administration (p. 433).

Pratt then lists five "powerful" reasons why administrators are likely to oppose many changes: 1) conflict avoidance or prevention of disturbance, 2) uncertainty about effect on public opinion, 3) cost, 4) professional pride since administration should have thought of it

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Pratt then lists five "powerful" reasons why administrators are likely to oppose many changes: 1) conflict avoidance or prevention of disturbance, 2) uncertainty about effect on public opinion, 3) cost, 4) professional pride since administration should have thought of it

first, and 5) accountability. He next lists a number of ways in which change agents can help reduce the anxieties of administrators (p. 434):

1. Understand the decision-makers
2. Approach decision-makers early
3. Observe the proper channels
4. Allow the administrator to take credit for the innovation
5. Use appropriate arguments

With respect to the latter Pratt recognizes that the characteristics of the organization may warrant attention:

> The arguments must match the ethos of the organization as well as that of the decision-maker. An innovative organization is more receptive to the argument that the change is in the forefront of educational thinking. A traditional organization prefers evidence that the innovation has been successfully instituted elsewhere (p. 435).

Postscripts

Alberta Education (January 1988) has posed the question "How effective is the curriculum development and implementation process?" (pp. 16-17). One of the generalizations derived from analyses of relevant documents and listed in response to this question is stated as follows: **There is a perception that Alberta Education does not follow research evidence on how to implement change** (p. 17). Information from field studies could support or refute this conclusion.

One set of hypotheses regarding curriculum change is that Alberta Education has successfully applied concepts and principles generated by the research on change in facilitating the passage of school systems, schools and individuals through the innovative-decision sequence leading to acceptance i.e., through knowledge, persuasion, decision to adopt, and decision to implement. A three-tiered set of activities involving both Alberta Education personnel and locally employed individuals as change agents can be envisaged. Within this partnership arrangement change agent roles are performed initially by Alberta Education and subsequently by school systems and schools. Potential adopters in the initial instance are school system and school personnel who, in turn, perform change agent roles in aiding passage of members of school staffs through the decisioning

sequence. Applying these arrangements from shared responsibilities the hypotheses with respect to innovative-decisions required in curriculum change might be framed as follows:

1. Alberta Education has successfully facilitated the passage of all adopters, including teachers, through the knowledge stage using mass-media channels of communication e.g., curriculum bulletins and newsletters, curriculum guides, teachers' conventions, etc.

2. Alberta Education has successfully facilitated the passage of school system representatives (opinion leaders, decision-makers, status leaders, administrators) through the knowledge, persuasion, decision to adopt and decision to implement stages via mass-media channels, provincial orientation seminars, training and demonstration workshops, and provision of multi-media kits, etc.

3. Alberta Education has successfully facilitated the activities of school system and school change agents in the latters' effort to aid teachers in passing the decision sequence of knowledge, persuasion, decision to adopt and decision to implement.

4. Alberta Education has successfully facilitated the efforts of local implementers of curriculum changes in making **confirmation** decisions e.g., via dissemination of evaluation reports and results of pilot activities, by fostering self-evaluations and assisting in local evaluations, etc.

Alberta Education (1988) in another response to the question "How effective is the curriculum development and implementation process?" has stated **there is a perception that Alberta Education does very little to promote effective implementation** (p. 17). Hypotheses concerning implementation are included above. Relevant literature on the topic is reviewed in the next section.

Concerning the role of a central government in applying knowledge about change processes to implementation strategies, the operational premises recommended in the Rand study on implementing and sustaining innovation (Berman and McLaughlin, pp. 40-45) are instructive.

Educational performance could be improved:

1. if more attention were paid to all stages of the local change process;

2. with adaptive implementation assistance, and

3. if the capacity of school districts to manage change were enhanced.

CURRICULUM IMPLEMENTATION

The Need to Study Curriculum Implementation

The previous section on change processes and the diffusion/adoption/implementation of innovations has noted that widespread attention to implementation by researchers in the various disciplines is relatively recent. In the past, many of the investigations, including those on education topics, were terminated at the adoption stage based on the naive assumption that decisions to adopt would automatically lead to implementation of the innovation by **users** (who might well be a different group from **adoption decision-makers**). Kimpston (1985) comments on this situation as follows:

> The Rand studies on educational change represented a major landmark for curriculum implementation research. At the beginning of the study, an extensive review of change agents' programmes was undertaken by Berman and McLaughlin to provide a background for later empirical studies. In this review, they reported that in almost all of the instances studied, **adoption** of the curricula or programmes was not an issue; problems of **implementation** of adopted curricula dominated the outcome and the success of all the projects studied. The situation does not appear to have changed in the succeeding ten years. . . . It is not yet known what should be done to successfully implement new curricula. Relatively few ideas make it 'behind the classroom door'; yet curriculum implementation is a major concern of our educational systems (p. 185).

Fullan and Pomfret (1977, pp. 336-340) suggest that there are at least five dimensions of implementation in practice - changes in materials, structure, role/behaviour, knowledge and understanding, and value internalization - which require adaptions to innovative developments. They then discuss four reasons why a focus on implementation is important:

1. **We do not know what has changed unless we attempt to conceptualize and measure it directly.**

   Defining implementation in operational terms is the *sine qua non* of measuring it. Studies of educational programs are replete with omissions about what aspects, if any, of the program under investigation were actually used during instruction. What the innovation actually consists of in practice has frequently been viewed as a "black box". Proxy indicators of the program (e.g., the sets of **intentions** for methods and outcomes, organization, resources, knowledge and understandings, values, inservice) have in reality been studied as inputs entering the black box with outcomes exiting in due course. The sets of intentions and antecedents comprise **inputs** which have been frequently mistaken

for **processes.** When this occurs, inputs are erroneously viewed as the program in action and the real happenings within the 'black box' (processes) ignored.

2. **To understand why so many education changes fail to become established.**

Fullan and Pomfret (1977) in their review of educational research in this area, found that the main problem in curriculum implementation which involved change was the requirement that roles (e.g., teaching behaviour) and role relationships (e.g., orientations about interacting with pupils) be altered. Cosmetic changes such as revisions to and updating of cognitive objectives for pupils, for example, do not require changes in roles and role relationships. As a consequence, implementing minor revisions and updates has been relatively easy.

3. **To prevent implementation from being ignored or being confused with adoption or with the determinants.**

Examples of confusions are recorded in (1) above e.g., mistakenly assuming that the **intentions** and **antecedents**, because they are described and in place, are isomorphic with actual program operations.

4. **To aid in relating learning outcomes to possible determinants.**

Excellent programs may have been rejected because measured gains by pupils were judged insufficient. The decisions not to use such programs might well have been ill-founded if the programs were not, in fact, implemented or were not implemented as intended. The consequences of something else, perhaps the previous program, were what were being measured.

Differing degrees of implementation or the use of some practices and the exclusion of others may be related to varying levels of achievement. Knowledge about which aspects of a program have an impact on learning can only be determined if adequate program descriptions and measurements are obtained.

Revicki and others (1981) have argued for appropriate measurement of implementation:

> We believe that the measurement of the implementation of attributes of a programme allows for a more accurate evaluation of the programme. Investigation of the relationship between level of implementation of programme attributes to relevant outcome measures provides programme developers with the necessary empirical information for fine-tuning innovative programs.
>
> The collection of implementation information by programme users should thus serve a diagnostic function which, when combined with

empirical verification of the linkages with desired outcomes, may well prevent education programmes from becoming stagnant and ineffective (p. 67).

Defining and Measuring Implementation

According to Fullan and Pomfret (1977) "There are enormous definition and methodological problems involved in considering which criteria and methods to use to assess whether an innovation has been implemented" (p. 340). At the time of their review (1977) these authors were able to find only fifteen studies that dealt with curriculum innovations from the fidelity perspective.

There are two main orientations used in defining and measuring program implementation. One is **the fidelity** of implementation. This is the dominant orientation where the main intent is to determine the degree of implementation in terms of the extent to which actual use of the innovation corresponds to intended or planned use. Within the fidelity perspective there are two types: those that focus on organizational change and those that address specific curriculum innovations. The second main orientation employs a **process perspective.** This has also been called **mutual adaptation** (e.g., in the Rand studies) since the focus is on how the innovation was changed and redefined during implementation with some attention as well to how the implementers have adapted.

Revicki and others (1981) in their review and critique of models for measuring program implementation have addressed methodological difficulties associated with gathering the required information. They note that ". . . the use of direct observation constitutes the best available method for assessing material, structural, and behavioural changes exhibited by a group of programme participants" p. 65). The annotations from several sources concerning instruments for use in recording classroom events illustrate a variety of foci selected by observers e.g., Simon and Boyer (1974), Borich and Madden (1977), Yuzdepski and Elliott (1985), and Manatt (1982). Revicki and others (1981) also observed that the implementation models they reviewed used mainly either a self-report (questionnaires, interviews) or a direct observation procedure.

The following figure illustrates the types of models, measurement foci and data collection methods which might be applied in describing and measuring program implementation.

If priority is assigned to documenting the extent to which the intended curriculum was implemented then the fidelity approach to describing and measuring is the appropriate choice. In the process of developing the data collection procedures the authors will, coincidentally, operationally define the sets of intentions which comprise the curriculum. Such a definition can be formulated **before** implementation of the **fidelity** approach is selected. In contrast, the definition can emerge

Major Orientation Perspective	Foci	Information Collection Procedures		
		Observation	Self Report	Document Analysis
Fidelity	Organizational Curriculum			
Process	Roles Role relationships Redefinitions e.g., - subject matter - materials - role/behaviour - knowledge/understandings - value internalization			

only **during** or **after** implementation if the **process** approach is used. In the latter case the description (definition) is about what actually happened without reference to **a priori** specifications. In both cases the measurement of the processes that actually occurred, with attention also to relevant inputs and outcomes, can provide an accurate and detailed definition (description) of the implementation.

More general definitions for implementation have been provided by Fullan (1982), Leithwood (1982) and Miller and Seller (1985) who are all members of the OISE faculty. Fullan (1982) defines it as "the process of putting into practice an idea, program, or set of activities new to the people attempting or expected to change" (p. 54). These activities result in a "change in practice on the part of teachers and students, which affects outcomes" (p. 55). Leithwood (1982) concurs that implementation is a process, not an event and says that "implementation involves reducing the differences between existing practices and practices suggested by the innovation" (p. 253). The reduction of these discrepancies is accomplished by processes characterized as follows: "Implementation is a process of behavioural change, in directions suggested by the innovation, occurring in stages, over time, if obstacles to such growth are overcome" (p. 254).

Miller and Seller (1985) lament about a common problem and offer their definition:

> Too often, implementation is centered on **things**, such as textbooks, teaching aids, explanatory booklets . . . rather it is a process during which the teacher adapts the program to his or her subjective reality . . . Thus we define implementation as a process that leads to shared ownership in the innovation. During this process, change will likely occur in an interactive way both in the teacher and in the innovation. The teacher acquires some ownership of the new program, and the developer relinquishes some control (p. 247).

Fidelity Perspective Measurement

Instruments designed to facilitate describing a program can be used for several purposes: 1) to plan implementation resources, procedures and outcomes (by displaying checklists of intentions), 2) to guide the management and coordination of the ongoing process (by providing rating scales or checklists for recording progress), and 3) to aid in reviewing progress, monitoring or evaluating. If a detailed description of the program is provided, an instrument can be tailored to reflect the characteristics selected for attention. Statements describing these attributes are developed, tested and validated and paired with rating scales or checkpoints. Exemplars are described in Simon and Boyer (1974), Borich and Madden (1977), Miller and Seller (1985), Good and Brophy (1985), and Yuzdepski and Elliott (1985), and Kimpston (1985).

One of the most detailed and explicit instruments developed in the fidelity tradition for describing degree of implementation has been developed by Hall and Associates (Hall et al., 1975;

Hall and Loucks, 1976, 1978; Hall and others, 1977; Loucks and others, 1975; Miller and Seller, 1985 pp. 249-264). This model uses a 'Level of Use' (LoU) interview to determine the participants' knowledge and use of an innovation. Different levels of use or degrees of implementation are reflected by individuals as their abilities to cope with the new venture improve over time. The title for the system is **The Concerns-Based Adoption Model** (CBAM) since it identifies 1) The Stages of Concern (SoC) experienced by teachers as well as 2) Their Levels of Use (LoU) of the innovation as they proceed through the stages outlined. These two dimensions for describing change are based on the assumptions that change is a process, (not an event) and that the change process is a personal experience.

The Stages of Concern about the innovation are as follows (Miller and Seller, 1985, pp. 252-263):

Stages 0-1: Unrelated concerns

0: Awareness -- little concern about or involvement with the innovation

1: Informational -- a general awareness and some interest in learning more. No worries.

Stage 2: Personal concerns

2: How the new program compares to the present personal situation, and about ability to cope.

Stage 3: Task Related Concerns

3: Management tasks i.e., best use of information and resources, efficiency, organizing, managing, scheduling and time demands.

Stages 4-6: Impact-related Concerns (which extend beyond self to the impact of the change on others)

4: Consequences as they impact on the teacher's students

5: Collaboration with others concerning the innovation

6: Refocusing on explaining other benefits and alternatives and their benefits.

The Levels of Use (LoU) dimension of the CBAM focuses on what teachers actually do with a new program (without attempting to explain causality). The seven levels of use of the innovation are each further amplified by descriptions of typical behaviours: the Categories of Behaviours are Knowledge, Acquiring Information, and Sharing.

In skeletal form the LoU dimension has these salient features:

LEVELS OF USE	CATEGORIES OF TYPICAL ACTIVITIES		
	Knowledge	Acquiring Information	Sharing
Level 0 Non-Use	•	•	•
Level I Orientation	•	•	•
Level II Preparation	•	•	•
Level III (first use) Mechanical Use	•	•	•
Level IV A Routine	•	•	•
Level IV B Refinement	•	•	•
Level V Integration	•	•	•
Level VI Renewal	•	•	•

The levels of use and the applicable activities are identified using interviews. This descriptive information is supplemented with possible reasons for points at which the teacher is performing obtained by use of the Stages of Concern (SoC) questionnaire and open-ended questions.

Since the Concerns Based Adoption Model can be too time consuming if the program examined is lengthy and complex and if large numbers of implementers need to be contacted, an adaptation by Leithwood and Montgomery (1980) may be preferred. The adaptation is called the Innovations Profile model.

The Innovations Profile Model (Leithwood and Montgomery, 1980, pp. 193-214), like its predecessor, uses a level of use dimension. However, a fixed number of levels is not used. Instead, a method is proposed for determining the number of levels which is appropriate to the curriculum innovation. Nine **Curriculum Dimensions** form a second dimension to form a two dimensioned matrix. The nine categories in the curriculum dimension are as follows:

1. Images or platform: The belief or orientations on which the program is based.
2. Objectives: The intended learning outcomes for the students.

3. Student entry behaviours: Expected student achievements before entering the program.
4. Content: The subject matter.
5. Instructional material: The resources to be used by the student.
6. Teaching strategies: Proposed teacher behaviour to facilitate learning by students.
7. Learning experiences: Student activities, mental or physical.
8. Time: The amount of time the student will spend on a given activity.
9. Assessment tools or procedures: The means used to assess student achievement.

An example of a two dimensioned matrix created to produce an innovation profile for a grade four science guideline is displayed by Leithwood and Montgomery (1980, p. 207). The illustration uses a subset of the curriculum dimensions listed above and only five levels of use:

Level of Use	Curriculum Dimensions		
	Platform	**Objectives**	**Teaching Strategies, etc.**
1	Teacher is unaware of or unable to articulate broad aims of science program. etc.	Teacher is unaware of objectives in guideline. etc.	Teacher is unaware of strategies outlined in guideline. Current strategies tend to be verbal and teacher directed. No student movement. etc.
2.	Teacher describes main emphasis of the program to be on knowledge objectives.	Teacher focuses on knowledge objectives (especially life science).	Teacher directed with more teacher questioning. Whole class. Divergent responses ignored. Little student movement.
.....	.....	.....	.....
5.	Teacher believes that knowledge, process and affective objectives are closely interrelated.	Problem solving objectives are well integrated with other objectives; process objectives on the organizing framework. Addresses affective objectives when and where more appropriate.	Teacher and students share decision-making. Extensive small group activity. Students engaged in open-ended problem solving. Flexibility in procedures. Open dialogue. Integrated science with other subjects.

Figure 3: Levels-by-Dimensions Profile of Innovation Practice - An Innovation Profile.

Relative to data collection, Leithwood and Montgomery have reported that when operational criteria provided by the Innovation Profile are used to structure interviews this approach has been

successfully used. They also report that ". . . enough data to develop a reliable User Profile for an individual teacher have been collected in the course of a twenty-minute interview" (p. 210).

Leithwood and Montgomery (1980) conclude their article with an illustration of data collected across all nineteen grade 4 science teachers in an Ontario school system. The data displayed (p. 211) are to be interpreted by reference to the appropriate Innovation Profile (i.e., Figure 3):

Dimension	Level					
	0	1	2	3	4	5
Platform	n = 4 % 21.05	n = 3 % 15.79	n = 5 % 26.32	n = 6 % 31.58	n = 1 % 5.26	n = 0 % 0
Objectives	n = 0 % 0	n = 5 % 26.32	n = 5 % 26.32	n = 8 % 42.11	n = 1 % 5.26	n = 0 % 0
Materials (n = 18)	n = 0 % 0	n = 5 % 27.78	n = 4 % 22.22	n = 3 % 16.67	n = 6 % 33.33	n = 0 % 0
Strategies	n = 0 % 0	n = 1 % 5.26	n = 5 % 26.32	n = 9 % 47.37	n = 3 % 15.79	n = 1 % 5.26

Figure 4: Levels-by-Dimensions Profiles of Current Practices in Relation to the Intentions of the Innovation - A User Profile (N = 19).

Process Perspective Measurement

As noted above, the process perspective approaches to describing and measuring implementation are intended to serve somewhat different purposes and are based on different assumptions than the fidelity perspective orientation. The purpose is to provide an accurate description of what actually happened during and as a consequence of implementation without reference to intended plans and practices. The fidelity of the match with intentions is of minor importance. Judgments about the quality and efficacy of the implementation practices employed are mainly based on standards selected after a content analysis of the data is completed. This is in contrast to the fidelity approach where the standards (set of intentions) are established **before** data collection commences and where the intents dictate the form and substance of the data and its collection.

Proponents of the process approach operate on the assumption that users can (and must) work out their own specific adaptations, particularly when the change characterizing the new program is a marked departure from the previous one. A mutually adaptive process between the user and the institutional setting is accepted as necessary. Berman and McLaughlin (1978) have noted in a RAND

Study report "Clearly, each local school district had to implement innovative practices in its own ideosyncratic way . . ." (p. 4).

The RAND Study reported by Berman and McLaughlin (1978) was a very large and broadly based on which has made a major contribution to the funded knowledge about implementation. The study employed a process approach to data collection and assumed that mutual adaptation would occur i.e., changes would be made to the innovation and to the user as seemed required by local conditions prevailing at the time. The researchers used five measures of the implementation which occurred as a consequence of the injection of U.S. Federal funding of innovative projects. The five measures as listed by Fullan and Pomfret (1977) were:

1. Perceived success (in terms of goals achieved) by teachers.
2. Perceived fidelity (in terms of implementation as laid out in the original proposal) by teachers.
3. Reported change in behaviour by teachers.
4. Reported difficulty of implementation.
5. Expected continuation of the project after Federal funds expired.

The major shortcoming of these measures according to Fullan and Pomfret (1977) was that

> ". . . all five measures are global in nature and do not require specific knowledge of the dimensions of the implementation . . . Of course, there are some good reasons for measures of this kind, not the least of which is the fact that a large number of innovations were used that made it extremely difficult to ask specific questions" (pp. 360-361).

The data collection was by means of questionnaire and interview. In implementation studies these have been shown to be as reliable as day-long ethnographic observations provided carefully framed questions addressing **specifics** are used (Leithwood and Montgomery, 1980, p. 210). However, in the RAND study the questionnaires and interviews had to be quite open-ended because knowledge of specifics was not available in advance.

A second shortcoming was that the information gathered was of the self-report variety. Since the interviews and questionnaires could not be comprised of questions dealing with specifics the self-report feature significantly weakened the validity of the information.

Fullan and Pomfret (1977, pp. 361-367) concluded their discussion on defining and measuring implementation by listing and discussing five dimensions of curriculum change which merit attention. The dimensions are as follows:

a) Subject matter or materials

b) Organizational structure (e.g., team teaching, individualization)

c) Role/behaviour (e.g., of teachers, of students, teacher-student relationships, attitudes toward and about students)

d) Knowledge and understanding (e.g., philosophy, values, assumptions)

e) Value internalization (commitment to the innovation).

For either a fidelity perspective or process perspective approach to describing and measuring implementation the foregoing list is worthy of consideration. Teaching and learning strategies could well be subsumed with the role/behaviour dimension.

Factors Affecting Implementation

Factors associated with implementation may be viewed as obstacles (negative influences), determinants (positive and facilitative forces) or as neutral or indeterminant. Discussions framed within these categories provide a basis for selecting guidelines and procedures for planning and carrying forward the implementation of any new program.

Obstacles to Implementation

Personal Concerns of Teachers

Since, for most school programs the day-to-day implementers are the teachers, concerns experienced by this group comprise a very significant set of obstacles. Leithwood (1982, p. 255) has provided a flow chart displaying sequential tasks in a strategy for implementing curriculum innovations. The first three tasks are proactive ones in that they provide a diagnosis concerning what is being sought, discrepancies between present practices and the intended new practices, and the identification of obstacles which might prevent the discrepancies from being reduced. All three of the diagnostic tasks require information from teachers.

The Stages of Concern instrument which is part of the Concerns-Based Adoption Model (CBAM) discussed in the previous section provides a means for identifying obstacles perceived by teachers. The information can be obtained from teachers prior to implementation as an aid in planning and during implementation as a basis for adjustments. Both sets of perceptions can provide guidance for professional development and supervision activities.

The general types of teacher-perceived obstacles identified by use of the **Stages of Concern** instrument have been categorized as follows (adapted from Miller and Seller, 1985, p. 252):

Stage		Concerns re:
0	**Awareness:**	Little concern (due to lack of awareness)
1	**Informational:**	No worries yet. Interested in learning more.
2	**Personal:**	Uncertainty about demand. Inadequacy in meeting demands. Uncertainty re: roles about the reward structure of the organization and decision-making Conflicts with - existing structures - personal commitments
3	**Management:**	Processes and tasks of using the innovations. Best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands.
4	**Consequence:**	Impact of innovation on teacher's own students. Relevance of program for students. Evaluating student outcomes. Changes needed to increase student outcomes.
5	**Collaboration:**	Coordination and cooperation with others regarding the use of the innovation.
6	**Refocusing:**	Exploring more universal benefits. Explaining major changes and/or replacement with a more powerful alternative.

Concerns 2-5 represent the sequential order of a set of concerns that require attention if the implementation is to be completely successful. The sequence ends with concerns about students and evaluating their progress (Stage 4) and finally with relationships with colleagues and superordinates (Stage 5).

Lack of Awareness

Fullan (1982) in the context of a discussion on planning, doing, and coping with change has suggested a major obstacle identified with those responsible for initiating and carrying forward new programs:

> One of the basic reasons planning fails is that planners or decision-makers of change are unaware of the situations which potential implementers are facing. They introduce change without providing a means to identify and confront the situational constraints, and

> without attempting to understand the values, ideas and experiences of those who are essential for implementing any change (p. 83).

Securing feedback periodically from teachers, as discussed in the section about their personal concerns, would obviously ameliorate this deficiency. Needs assessments after initial orientations to the new program and formative evaluations during implementation would also provide specific direction about the supports and adjustments required.

Lack of Commitment to the Process of Change

Fullan and others have reiterated throughout their publications that implementation should not be viewed simply as an event but as a process. It does not end with placement of curriculum guidelines and learning resources with teachers accompanied by the usual one-shot briefing or orientation. Instead, a process involving passage through a sequence of events (e.g., decisions) and levels of use of the intended procedures occurs and is frequently accompanied by alterations to the program. Fullan (1982) has noted that commitment to a particular change while ignoring the process can be dysfunctional:

> One of the initial sources of the problem is the commitment of reformers to see a particular change implemented. Commitment to **what should be changed** often varies inversely with knowledge about **how to work through a process of change**. In fact, as I shall claim later, strong commitment to a particular change may be a barrier to setting up an effective process of change. The adage where there's a will there's a way is definitely not an apt one for the planning of educational change. There is an abundance of wills, but they are in the way rather than pointing the way (p. 82).

In another publication (Fullan and Park, 1981, pp. 52-69) Fullan lists a number of suggestions for facilitating implementation, many of which reflect a concern about the change process. Suggestions to the provincial Ministry of Education in Ontario, for example, include the following: 1) Policy should provide for **follow-through** plans as to how implementation might proceed; 2) Curriculum Guidelines and support documents should be developed with "implementability" in mind, contain classroom implementation models as illustrations, and be accompanied by follow-through support about how to use them; 3) Professional development to create the required individual expertise could be realized by additions of credit courses, principals' courses and graduate level programs focusing on implementation and change; and 4) Supplementary Resource Handbooks for Administration should be provided along with video tape inservice kits.

Boyd (1979) in his article about the politics of political change has commented concerning noncompliance and nonimplementation that "Unhappily, for reformers, it turns out that it is one

thing to get innovative schemes accepted and launched and quite another to get them implemented successfully" (p. 16). He notes elsewhere than one reason for the lack of reform in U.S. education is the "professionalization of reform --" the development of a cadre of experts "armed with solutions looking for problems" (p. 14). However, the constraints operating inhibit the impact of these professional zealots. By default much of the change is reflected in the available commercially published materials.

Practices that Do Not Work

Implementation strategies that **usually** did not work are listed and discussed by Berman and McLaughlin (1978, pp. 26-28). These investigators had focused their attention on the basic processes that were reflected in local initiation, management and follow-through of 400 federally funded innovative projects. The authors underscored the use of the qualifier **usually** since, in some instances, the practice was beneficial. Practices which generally did not facilitate successful implementation were these:

1. Use of outside consultants

   Lack of timeliness and availability on an "on-call" basis were viewed as inhibiting influences.

2. Packaged management approaches

   Rigidity, inflexibility, and perceptions about lack of fit with local circumstances were offered as explanations. Staff members were deprived of a sense of ownership because of the prescriptive nature of the materials.

3. One-shot preimplementation training

   Teachers' needs change over time and either these cannot be anticipated in advance or they are not yet meaningful to trainees at the time of the single training session.

4. Pay for training

   Extrinsic rewards such as pay for training cannot stimulate the required commitment of teachers if they do not see the changes required to be in their professional self-interest.

5. Formal evaluation

   This approach failed to perform a formative function during the evaluation and generally ignored process issues which could lead to subsequent improvements. The data were not provided in sufficient time to be useful.

6. Comprehensive projects

K-12 projects, for example, seemed to be attempting too much too soon. The comprehensive nature of any project frequently meant that resources were too thinly spread which operated against creating a "critical mass" of participants in any one school and in diluting all forms of support. The authors noted that "these projects were sharply reduced after the end of federal funding" (p. 28).

Local Obstacles

Berman and McLaughlin (1978) also noted that idiosyncracies which characterized the local district operated as obstacles to successful implementation "The differences between success and failure depended primarily on how school districts implemented their projects, not on the type of federal sponsorship" (p. 10). The amount of funding, for example, was not correlated with success (p. 11). The local district idiosyncracies which correlated with unsuccessful implementation in the RAND study were these:

1. Opportunistic behaviour

   Accessing funds because the money was available coupled with lack of commitment correlated highly with poor and spotty implementation and disappearance of programs with the last federal check (pp. 11, 18).

2. Top-down mobilization of support

   Administration by fiat, by itself, was not sufficient to persuade teachers to expend the energy and effort required for a project for which they had little responsibility (p. 18).

3. Cooptation behaviour

   This occurred when the staff adapted the project, usually emasculating it to meet their own needs, without any change in institutional behaviour or practices (p. 16).

4. Lack of district administrator support

   Some grass-roots projects failed due to lack of support reflected by inadequate or insufficient support services (e.g., staff training and technical assistance) which could be attributed to lack of central office commitment (p. 18).

Determinants of Implementation

Mutual Adaptation

Factors associated with successful implementation were also reported in the Rand study (Berman and McLaughlin, 1978,pp. 29-30, 34). Throughout the report **mutual adaptation** is highlighted. It is defined as a modification or reinvention of the innovation coupled with changes in the implementer, both adjusted according to local conditions. Such mutual adaptation resulted in more effective implementation leading to improved student performance, teacher changes, and enhanced continued use of the project at the classroom level. Elements of a strategy associated with mutual adaptation were these (p. 34):

- Concrete, teacher-specific, and extended training.
- Classroom assistance from project or district staff.
- Teacher observation of similar projects in other classrooms, schools or districts.
- Regular project meetings that focused on practical problems.
- Local materials development.
- Principal participation training.

Supportive District Environment

The Rand study investigators Berman and McLaughlin (1978) concluded that a supportive district environment was necessary for an innovation to be effectively implemented and sustained (p. 34). These authors found that those district administrators that operated in a problem-solving mode were facilitative and frequently successful in implementing. (The opportunistic pattern followed by some was associated with poor implementation). Kimpston and Rogers (1988) have described how teachers and community members can work collaboratively on a major innovation. Fullan and Parks (1981) have included Board and Community Support as a significant entity in providing initial endorsement and subsequent support.

Characteristics of the Innovation

Those curriculum changes which are communicated clearly and are perceived to be easy to implement will be implemented more successfully than those characterized as complex and lacking in explicitness (Rogers and Shoemaker, 1971, pp. 134-172; Rogers, 1983, pp. 210-240; Gross, 1971). The

other attributes of innovations listed in the Rogers publication also characterize curriculum changes which would be viewed relatively favorably:

- Relative advantage (better than the current program)
- Compatibility (congruency with current beliefs and teaching practices)
- Observability (extent to which results are visible to others)

Strategies and Tactics

Fullan and Pomfret (1977) list in-service training, resource support (time and materials), feedback mechanisms, and participation by teachers as significant elements in a set of strategies and tactics comprising a determinant of implementation. Lack of resource support (time and materials) was identified as a significant constraint to implementation by Gross and others (1971), Charters and Pellegrin (1973) and in the Alberta based studies by Crowther (1972) and Downey et al. (1975).

The other elements in the foregoing list -- inservice training, feedback mechanisms and participation by teachers -- are very important in facilitating implementation. They receive attention in the next major section of this review.

Teachers' Sense of Efficacy

The prime importance of teachers in performing their roles as front-line implementers is accepted as a truism in discussions about curriculum change. Berman and McLaughlin (1978) found in the Rand implementation study that "above all, the teacher's sense of efficacy emerged as a powerful explanatory variable; it had major positive effects on all classroom-level outcomes" (p. 34).

Fullan (1985, p. 396) offers guidelines about enhancing teachers' sense of efficacy and other findings from four case studies directed at change in individuals. The purposes of the four interventions were to alter the individual teacher's ways of thinking and doing, developing new skills and aiding them in finding meaning and satisfaction in new ways of doing things. The findings are summarized as follows:

1. Change takes place over time.
2. The initial stages of any significant change always involve anxiety and uncertainty.
3. Ongoing technical assistance and psychological support assistance are crucial if the anxiety is to be coped with.
4. Change always involves learning new skills through practice and feedback - it is incremental and developmental.

5. The most fundamental breakthrough occurs when people can cognitively understand the underlying conception and rationale with respect to "why this new way works better".

6. Organizational conditions within the school (peer norms, administrative leadership) and in relation to the school (e.g., external administrative support and technical help) make it more or less likely that the process will succeed.

7. Successful change involves pressure, but it is pressure through **interaction** with peers and other technical and administrative leaders (p. 396).

Guidelines for Governments

The section of this review (by Harvey Research) which addressed the change process concluded with some operational premises for U.S. federal policy which were recommended by Berman and McLaughlin (1978) in the Rand Corporation implementation study report. The three operational premises are repeated here, and are as follows:

1. **Educational performance could be improved if more attention were paid to all stages of the local change process** (p. 40).

The authors note that effective projects go through three stages - **mobilization** (which includes adoption), **implementation**, and **institutionalization**. They argue that federal policy and funding should be directed toward **all** stages, not just mobilization. Planning grants (one year), implementation grants (two or three years) and an incorporation grant (two years duration) are suggested.

2. **Educational performance could be improved with adaptive implementation assistance** (pp. 41-42).

The Rand investigators recommend that assistance with this focus should not rely on technology (e.g., packaged curricula), resources and projects. Instead, help to local districts is needed as they adapt changes to local conditions. "Adaptive" assistance of this type has these features:

- **System focused** on the district and on the management of change
- **Continuity** - assistance offered on an ongoing basis
- **Practitioner-based** - local or regional resource personnel should provide assistance
- **Process-oriented** - supportive of <u>local</u> efforts to identify and solve problems and facilitative of "learning by doing".

3. **Educational performance could be improved if the capacity of school districts to manage change were enhanced** (p. 42).

Staff development is recommended, funded by a single, categorical grant to be administered by the states.

Fullan (1982, p. 255) has cautioned that there are serious practical limitations to how much governments can directly determine what happens in practice. The guidelines which he suggests reflect this conclusion and apply to two kinds of roles for governments: **social experimentation** or development, and **legislative implementation**. Social experimentation describes the types of programs examined in the Rand implementation study where local adaptation is desired and desirable. Legislative implementation on the other hand is, by definition, more structured and prescriptive; both top-down and bottom-up communications and interactions are required.

With reference to social experimentation programs Fullan and Pomfret (1977, p. 391) in their review offer the following guidelines to local and central governments:

Instead of promoting specific innovations, emphasize broad-based programs and provide support for local development of specific forms of implementation. This differentiation of emphasis would facilitate development of clarity and explicitness of programs on the part of users. At the outset, for example, they would need to submit a proposal and implementation plan which would clarify the nuances about the program.

Evaluation of innovative projects, at least during early implementation should be directed toward facilitating local system capabilities through data feedback and other forms of support, rather than judging success or failure. Formative, not summative evaluations are recommended during this period.

The incentive system for implementation should be drastically altered at all levels. On this point and others Fullan and Pomfret (1977) conclude as follows:

> If there is one thing that stands out in our review, it is that effective implementation of social innovations requires time, personal interaction and contacts, in-service training, and other forms of people-based support. Research has shown time and again that there is no substitute for the primacy of personal contact among implementers, and between implementers and planners/consultants ... Equally clear is the absence of such opportunities on a regular basis during the planning and implementation of most innovations. All of this means that new approaches ... should include longer time perspectives, more small-scale intensive projects, more resources, time and mechanisms for contact among would-be implementers ... there is no question that effective implementation will not occur without them (pp. 391-392).

With reference to curriculum change generally, for both social experimentation programs and legislative implementation programs, Fullan (1982, pp. 250-256) suggests the following guidelines for consideration by governments:

Concentrate on helping to improve the capacity of other agencies to implement changes. This echoes the substance of the three guidelines presented by the Rand implementation study authors. Fullan concludes with this guideline following a discussion of compliance and capacity. He notes that compliance does not mean that implementation has occurred. Further, preoccupation by governments with monitoring and regulating to ensure compliance may hinder implementation in that it diverts energies, talent and attention away from developing local capacity to make improvements.

Governments need to be clear about what the policy is and spend time interacting about the meaning, expectations, and needs in relation to local implementation The interaction recommended will benefit both local users and government personnel, according to Fullan. Clarification can be achieved for both parties and the government is kept updated about the local needs and realities of implementation.

For any new policy, governments should see to it that they or someone else is addressing and looking at the program development and in-service assistance needs. Fullan notes that government resources and funding have frequently been used to develop and validate quality programs but that governments have rarely directed corresponding resources to support in-service assistance during implementation.

Government agency leaders should take special steps to ensure that their own staff, especially those who have the most contact with the field, have the opportunity to develop knowledge and competence regarding the policy and program, as well as in how to facilitate implementation. Fullan notes that both the **content** of any change and the **change process** need to be internalized by government personnel.

Explicit implementation plans are needed by governments to guide the process of bringing about change in practice. On another occasion Fullan and Park (1981) prepared a resource booklet entitled **Curriculum Implementation** for use by various education agencies in Ontario, including school boards and the provincial government. Table 2 (p. 35) from this publication contains the elements which might be included in an implementation plan for any new program.

Factors Influencing Implementation

and Possible Strategies

	Factors Influencing Implementation	Possible Strategies
1.	Multiple guidelines (overload)	Sequence guidelines (any given teacher should not have to work on more than one major change at a time)
2.	Board and Community Support	Board administration to ensure that board endorses the change and is willing to provide some resources for implementation.
3.	Time and line and monitoring (information system)	Establish a time line (e.g., 3 years) during which the other nine tasks would occur. This time period should be characterized by continuous follow-up support, information gathering and sharing (to monitor and address problems and eventually to evaluate the change).
4.	Clarity and need for change	Define with teachers the change, and compare present practice with desired change. Need for change to include the "dimensions" of implementation - materials, teaching approaches, beliefs, and student performance.
5.	Quality and availability of materials	Carry out an inventory, acquisition and development of materials.
6.	Principal role and support	Policy, in-service, and monitoring of principals to ensure that they play a direct leadership facilitation role.
7.	Consultant role and support	Policy, in-service, and monitoring of consultants to ensure that they play a facilitation and technical assistance role.
8.	Quality and amount of in-service assistance for teachers	Develop a specific, continuous in-service plan for teachers. Use teachers as well as consultants to lead in-service sessions.
9.	Teacher/teacher interaction	Provide opportunity for teacher/teacher interaction at board level (committee, workshops) and school levels (workshops, meetings, etc.).
10.	Availability and use of external resources	Actively identify possible external resources (faculties of education, OTF, OISE, Ministry, etc.) and build their use into an overall plan (Fullan and Park 1981, p. 35).

A valuable publication prepared in Alberta which deals comprehensively with planning for implementation of new programs is **Inservice Education for Implementation of New and**

Revised Programs (Tripartite Committee on Inservice Education, October, 1980; see also Patterson, 1986, Appendix C). Universal, critical elements for customizing implementation plans are identified in the publication as **Basic Tenets**. These include references to responsibilities, resources and inservice, as well as the cooperative and collaborative nature of many of the activities. The Recommendations section also deals in a comprehensive fashion with implementation plans and planning. The concluding paragraph mentions salient points addressed throughout the document:

> Change of any kind, of which implementation of programs is a significant example, is a complex process requiring a high degree of cooperation and integration. In recognition of that fact the committee has purposely prepared a terse report outlining basic tenets. The committee cannot stress strongly enough the need for individuals and groups concerned to undertake the detailing of a specific application for each new and revised program, and subsequently adapting that application to their particular situation (p. 15).

INSERVICE EDUCATION OF TEACHERS

The previous sections have reiterated throughout the importance of the roles of local users of new programs in achieving successful implementation. Teachers in particular, have been frequently named but principals and central office staff of school systems have been mentioned as well. Government personnel have also been identified as important contributors. All of the foregoing require training "in-service" about new programs. Much of the literature in the upcoming section is related to the inservice education of teachers. It is assumed, however, that many of the conclusions and generalizations derived from the research about inservice programs for teachers could appropriately be applied to planning professional development activities for other groups.

The inservice education of teachers section of this review is relatively brief. One reason for this relative brevity is that many of the concepts have already been discussed in either explicit or implicit form in the preceding sections. Since inservice education is naturally interwoven with the processes of change and is a major need in implementing new programs, some of the findings from the literature on these topics have already been included. A second reason for the brevity is that a lengthy discussion paper entitled **Effective Inservice: A Re-examination** by Patterson (1986) has captured many of recent highlights from the empirically based literature.

For the period covered by their review of inservice education Denemark and MacDonald (1967) found the research-based information disappointingly scanty. Projects referred to as experimental nearly always were loosely evaluated demonstrations. Articles and books largely based on opinion and anecdotal descriptions abound in the area. However, recently more of the literature is framed within an empirical base with objective data provided about activities and outcomes. Particularly valuable are the reviews based on meta-analyses techniques (Glass, 1976, 1977). With meta-analysis, all quantitative studies on a particular topic (e.g., inservice education of teachers) can be compared using a common metric or method of averaging. The precise quantitative effects of a particular treatment variable (e.g., a particular aspect of inservice such as providing consultative feedback) can be compared with other procedures and the differences expressed quantitatively. Effect size is operationally defined as the difference between the means of the treatment and control group divided by the standard deviation of the control group. The result is an excellent complement to the traditional box-score method of synthesizing research findings (e.g., 67% of the studies support this generalization). In this review, meta-analyses reviews by Wade (1984), Joslin (1980) and Lawrence (1981) receive attention.

Meta-Analysis Studies

What Makes a Difference in Inservice Teacher Education?

Ruth Wade (1984) provided answers to this question by a meta-analysis on inservice of teachers. Over 300 articles were reviewed and those that met the following criteria were selected: 1) quantitative rather than qualitative; 2) the data necessary for calculating effect size were present; 3) the data were pertinent; and 4) subjects were public school teachers or their students in K-12. Ninety-one studies contributed to Wade's analyses and syntheses. The **measured impacts** are summarized as follows:

Overall effect was .52 or 20 percentile points (meaning that a teacher receiving some type of inservice treatment and at 50th percentile of the treatment group would be at the 70th percentile of the untreated, no service group) indicating that inservice programs in this set were moderately effective. Wade mentions that this is most reassuring to those concerned about costs (time, money, energy).

Learning attempts were highly effective; .90 was the mean effect size, equivalent to 32 percentile points (meaning that the average teacher in the inservice groups at the 50th percentile was performing as well as the teachers in the no-treatment groups operating at the 50 + 32 = 82 nd. percentile).

Behaviour of teachers was changed moderately (.60 effect size, 23 percentile points).

Reaction by teachers to training was somewhat positive (.42 effect size, 16 percentile points).

Results as measured by effects on pupils showed inservice as mildly effective (.37 mean effect size, 14 percentile points).

Inservice Treatment variables had impacts as follows:

Duration - length of inservice (a few hours to 30 hours; above or below 6 months) had no effect.

Training Group Characteristics - elementary and secondary teacher groups **combined** exhibited highest effect sizes; elementary teachers alone benefited much more than groups comprised only of secondary teachers.

- volunteers did not benefit significantly more than those required to attend; compulsion in attendance was not a significant factor.
- the size of the group (1-20; 21-40; 41-60; greater than 60) had no effect.

- Teachers and state department personnel had only small positive results
- Administrators and consultants were so seldom used no analyses were possible.

Recommendations by Wade included these:

- Encourage independent study and self instruction as alternatives and supplements to the workshop format.
- For group instruction suggest that instructors set clear goals and take major responsibility for the design and teaching of the class rather than encouraging participants to assume these roles.
- For group instruction use instructional techniques such as observation, micro teaching, video/audio feedback, and practice as alternatives to the more usual lecture and discussion.

Summary: Figure 1 from the Wade (1985) journal article lists the most effective aspects of inservice in the 91 programs:

Inservice Practices Associated with Above-Average Learning Effectiveness

Practice	Effect Size
Attempts to increase participant's learning (cognitive)	.90
Federal, state, and university initiated programs	.69
Training groups with elementary and secondary teachers	.67
Participants who were selectively chosen to particpate	.76
Self-instruction	.92
Independent study	.98
Strong leadership roles by instructors	.66
Instructional techniques:	
Observation	.81
Micro teaching	.78
Video/audio feedback*	.64
Practice	.55

*As noted in the section on change processes, feedback to teachers is a powerful determinant concerning whether or not a practice will be maintained.

A Synthesis of Research on the Effectiveness of Staff Development Programs

For this meta-analysis review Lawrence (1981) and assistants consulted 6000 abstracts and references. About 150 documents reported some quantitative findings. Fifty-nine studies met the criteria set by the author and the results of these were sorted, averaged and effect sizes determined.

The studies were sorted into four categories of objectives set for participating teachers: cognitive, affective, performance and consequence. Cognitive objectives referred to acquisition of knowledge and concepts, affective ones pertained to changes in attitudes, while performance objectives included observable skills and behaviours of teachers. Consequence objectives were the same as the "Results" ones used by Wade (1985) -- the changes in pupils resulting from the changes in teachers and teaching.

In the brief 13 page document prepared by Lawrence (1981) no effect sizes are reported. He enumerates eleven general findings derived from the results reported in the fifty-nine studies.

The inservice programs most successful in accomplishing their objectives were ones that:

- involved teachers actively in initiating, planning and conducting the program;
- were designed as a collective effort of a faculty, with common purposes and directed toward general faculty development rather than focusing on the separate goals and needs of individual faculty members;
- were funded in ways that permitted the teachers and administrators of individual schools to sponsor them, to design activities, and to select inside and outside leadership as appropriate to the plans (Programs led by school supervisors, teachers, and college personnel met their objectives better than those led by state department of education personnel, school district staff, or other outside consultants);
- were scheduled at times (evenings, summers) that did not compete with but complemented other professional obligations of the participants (Programs scheduled during work hours were considerably less successful in achieving objectives);
- had diverse program patterns that seemed to emphasize teacher responsibility -- self-instruction, peer study groups, college courses, one-to-one consultation (The formats loosely labeled as workshop and staff meeting were considerably less successful in achieving objectives);
- involved participants in both receptive and active roles -- receiving new ideas and putting them into action -- rather than one type without the other;
- had sequences in which participants could try out new things in their classrooms (or in simulations) and then receive appropriate feedback from a skilled person (Programs in which participants were expected to store up new ideas and behaviour prescriptions for a future time were distinctly less successful in achieving objectives);
- had leaders who were linkers with a university or other centre concerned with professional development;

- had opportunities for participants to see demonstrations of exemplary practices, and to learn the skills of observing the practices in themselves and others;
- did not rely on lecture presentations as the main activity;
- were conducted at the school site if the programs emphasized affective or skill performance objectives (pp. 4-5).

Many of these general findings are repeated and credited to Lawrence in the upcoming review by Cooper and Jones (1984).

Lawrence concluded his paper with a description of four studies focusing on different aspects of inservice that were noteworthy with respect to feasibility and ease of implementation, inexpensive, but rigorous in controlling for threats to valid interpretation.

Inservice Teacher Education: A Meta-Analysis of the Research

(Joslin, 1980)

Joslin applied the same criteria as Wade and Lawrence in selecting articles for inclusion in the meta-analysis procedures. All reports of studies using either an experimental or quasi-experimental design with results expressed in quantitative terms that met these criteria and that were published between 1965 and 1978 were selected. The set was comprised of 137 research studies involving a total of 32,000 teachers who had received inservice treatment and about 15,000 control subjects. The average length of inservice treatment was 23.8 hours spanning ten days over a period of eleven weeks.

Overall Effect size was .47 which meant that an average teacher receiving some kind of inservice program would be performing at the 68th percentile of all teachers in the control groups (effect size as 18 percentile points). Joslin concluded that inservice teacher education is effective in changing teacher achievement, skills and attitudes. However, Joslin also found that attempts to change students through teacher participation in inservice programs were of questionable effectiveness (Effective teaching skills associated with enhanced student learning may not have received attention in many of the studies).

Instruction Techniques and Program Features shown to be moderately effective included these:

- Programs planned to achieve concrete objectives related to subject matter content;
- Programs planned around highly structured formats such as training programs, minicourses, laboratory experiments and institutes;
- Inservice experiences planned to take place within the local district during the working day or after hours;
- Programs planned around a treatment that has been field-tested or used extensively.

Training Group Characteristics which were associated with significant effect sizes were as follows:

- Teachers of elementary school grades;
- Teachers with less than 10 years experience;
- Teachers with between one and 5 years experiences achieved much success.

Conventional Review of the Literature on Inservice Education

One conventional review of the research on inservice teacher education is summarized at this point. This review also summarized the findings and conclusions from a large set of studies. Unlike the aggregations and averages of quantitatively expressed results which characterize the meta-analysis syntheses of the literature, the conventional review includes results obtained through qualitative procedures which did not employ comparison groups.

The State of the Art in Inservice Education

Cooper and Jones (1984)

Over sixty sources are cited. Their general conclusions concerning adult learning and features of successful inservice programs are enumerated below.

Adult Learning

The art and science of adult learning have implications for planning and carrying forward inservice programs. Teachers are adult learners and components from this field of study, it is argued, should be used or considered in their inservice education programs. The components are self-directed learning, the experience base of adult learners, adult developmental stages, and problem-centredness in adulthood.

Self-Directed Learning becomes increasingly preferred as an individual matures. Self-help instructional modules, independent study using multi-media kits, and various other learning aids such as worksheets and bibliographies are obvious applications of this principle. Multimedia presentations have been generally judged to be more effective than print materials. Computerized information networks should meet the needs of many who have the requisite self-help skills and motivation.

Experience Base of Adults needs to be recognized and utilized in inservice programs.

- Differentiate the learning experiences having regard to individual differences in background and past experience of the learners;
- Use the experience of teachers as appropriate;
- Catalogue and make accessible teachers who might advise on specific pedagogical technologies.

Adult Developmental Stages should be considered in planning inservice. As people mature, increasing amounts of learning are in the affective domain (which is seldom addressed in inservice). A teacher's morale and commitment and need to grow as a person and as a social entity need attention. (The Concerns Based Adoption Model levels of concern have application here).

Problem Centredness in Adulthood means that as the adult matures there is an increasing focus on present life activities rather than on future roles. As a consequence, there is a desire for immediate application of learning to current problems or circumstances.

General Features of Successful Inservice Programs

- Instructional formats such as demonstrations, micro-teaching, creative uses of technology and other innovative approaches which utilize all the senses are more effective than lectures alone, panels, films and brainstorming;
- Interaction and involvement foster learning;
- More complex or higher level learning objectives require activities with high experience impact and more face-to-face activity (small groups);
- Minor changes in curriculum such as updating of content may be provided for in a one-day or "one-shot" session;

- Inservice programs that most effectively address teachers' needs are those that involve participants both in receiving new ideas and putting them into practice (i.e., making transfers to practice sessions) rather than only in receptive roles or only in active roles;
- include elements which could be tried out in classrooms or in simulations, in order that a novice may receive immediate feedback from a skilled person;
- include demonstrations of exemplary practices, and provide participants with opportunities to learn skills by observing others;
- do not rely on lectures as the primary mode of delivery;
- are scheduled not to conflict with participants' other activities;
- permit school teachers to sponsor and design programs and select leaders for inservice programs (In general, programs led by teachers, school supervisors, and college staff have been judged more effective than those led by outside consultants, school district staff, or state department of education personnel) (pp. 42-43).

Gordon Lawrence is credited with formulating many of the foregoing conclusions. Cooper and Jones noted that some of the generalizations Lawrence had published earlier had been modified or deleted in the light of new findings and new research procedures (See Lawrence in Edelfelt and Johnson, 1976, pp. 18-19) Alterations by Lawrence in the recent listings include these:

- current favoring of the use of university-linked leaders;
- currently, administrator pre-planned goals and activities are favoured over participant selections;
- currently, less favor is attached to group activity than working alone.

Channels of Communication in Inservice Education of Teachers

The prime importance of communication from teachers, among teachers and to teachers during inservice activities may not have been highlighted sufficiently in the foregoing reviews. At this point brief reference is made to channels and types of communication mentioned previously in the discussions concerning change and implementation of innovative programs. Channels of communication merit consideration as foci for studies concerning supporting teachers in service.

Welch and Willson (1977) reported on an experimental study which compared what they termed channels of communication. The five channels were differentiated by six characteristics: users, location, time of instruction, instructors, instructional responsibility, and school district support. Four outcome criteria were used: cost, usage rate, satisfaction and the Havelock Factors. The last named is a set of factors which research has shown to account for most dissemination and utilization (D&U) phenomena:

Brief Description of General D&U Factors[a] Specific to Channel

1. Linkage - allows direct contact; two-way interaction.
2. Structure - systematic strategy; timing to fit user's problem-solving cycle.
3. Openness - flexible strategies; best channel allows informal communications between sender and receiver about the innovation.
4. Capacity - capacity of channel to carry maximum information; accessibility to maximum number of users in minimum time.
5. Reward - channel which can convey feedback (+ and - reinforcement); most effective channel has best reward history for sender and receiver.
6. Proximity - easily accessible channel, familiar to the user.
7. Synergy - the number and diversity, continuity and persistence of different channels used to transmit the message.

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[a]From Havelock, R. G. **Planning for innovation through dissemination and utilization of knowledge**. Ann Arbor, Mich.: Institute for Social Research, The University of Michigan, 1973, pp. 11-12.

The types of inservice programs compared were described as follows (results for each are tabulated below):

Accessible - at junior college taught by junior college instructors once/week in evenings for one semester

Centers - at off-campus (other school) locations taught by teachers once/week in evenings for one semester.

Collaborative - at local schools instructed by curriculum experts at beginning of year and by university professors throughout the year. The foregoing supplemented by resource teachers trained at the sponsoring university to aid in curriculum implementation . School districts agreed to implement the curriculum.

Portal - at local schools by local teacher instructors who had received training and had been certified (Alberta Social Studies Inservice Model). After teaching hours for one semester. School districts agreed to implement the curriculum.

Workshop - At sponsoring university by university professor instructors, during summer for eight hours/day for two weeks. There was no school district commitment to implement the curriculum.

Delivery System Characteristics (Welch & Willson, 1977, p. 229)

SYSTEM	D&U Factor Rating	NSF Cost Per Teacher Participation House	Criteria	
			First Year Use Rate	Participant Satisfaction Rating*
Accessible (234)	2.87	$ 9.50	84%	100%
Centers (75)	3.02	$ 17.10	67%	90%
Collaborative (92)	3.43	$ 7.80	96%	90%
Portal (636)**	3.54	$ 1.50	48%	98%
Workshop (61)	2.82	$ 3.20	51%	93%
Average	3.14	$ 7.80	69%	94%

** Similar to Alberta Social Studies Inservice Model

*Percent indicating positive reaction to delivery system.

Note: Parenthetical numbers indicate teachers trained at each project.

Teacher Participation & Interpersonal, Local Channels of Communication

Teacher participation in developing curricula is frequently associated with interpersonal channels used to diffuse information about the product developed. A number of researchers have noted that caution is needed in assuming that participation, **ipso facto**, automatically ensures successful implication e.g., Fullan and Promfret (1977, pp. 376-379). Another Canadian (Pratt, 1980) has said "The fallacy of the 1960s was that teacher participation was all that was needed for successful innovation" (P. 435). Kimpston (1988) agrees: "The degree of involvement or participation in a curriculum planning process does not appear to directly influence perceptions of that process... This is a surprising finding" (p. 365). Favourable perceptions by participants appear to be directly related to the job done rather than to how busy or involved they were.

Applying Technologies

Applications of technology are obvious channels for use in both the mass media and interpersonal communications approaches discussed in the section on change processes. Shavelson and Stern (1981), for example, have noted that teachers do not consistently use the instructional development model taught in universities (lesson and unit plans). This model, they say, although consistently taught is consistently not used. Low and associates (1988) suggest a solution which uses computer associated communication of the contents of a data base of selected and tried instructional strategies. Information about new curricula could be communicated by these means as well.

PRESERVICE TEACHER EDUCATION AND CURRICULUM CHANGE

Fullan (1982) has noted that formal preservice teacher education programs do not directly prepare teachers to implement changes:

> More broadly, they must have abilities which are barely (if at all) touched by the formal teacher education program: interacting with and learning from peers, using and relating to subject consultants, relating to the principal, talking to and working with parents. In short, not only are there difficulties in learning how to use new methods (such as applying theory to practice), but also there is almost a total neglect of the phenomenon of how changes are and can be introduced and implemented (p. 260).

Fullan next reports on a national survey of student teachers and faculty in Canada who were asked to what extent their program did and should "prepare teachers who have the perceptions and skills to implement changes in the schools". A large majority (85%) from both groups agreed that "great" and "very great" attention was not being directed to this goal. Seventy-three percent of the faculty and 64% of the students thought that the goal should receive great or very great emphasis. In this survey the goals that were perceived as receiving the highest emphasis were those that were aimed at preparing teachers "who were knowledgeable in subject areas" and "who can adapt to and work within existing school systems."

Alberta faculties of education at the three universities apparently do not, in direct fashion, aim to prepare teachers in their undergraduate programs to cope with change and to contribute to change processes in their school. A recent survey report entitled Teachers' Evaluation of their Preparation for Teaching (Miklos, Greene & Conklin, 1987) indicates that apparently knowledge/skills/understandings relative to coping with and contributing to change such as new

curricula are not on the undergraduate menu; none of the questions on the survey forms addressed these topics.

Teachers who had graduated from one of the three Alberta universities and were in their first, third or fifth year of teaching were respondents to the survey. They were provided opportunities throughout the questionnaire to retrospect and comment freely about the contributions of the program to their teaching competence and to respond in open-ended fashion concerning improvements required. None of the responses by practising teachers which were reported indicated that curriculum changes posed a problem or that the universities had been remiss in equipping them to cope with such changes.

Several of the questions on the questionnaire used in this follow-up survey of education graduates addressed, in tangential fashion, the competencies needed in managing change: the questions referred to planning, evaluating pupil progress, relating effectively to other teachers and participating in the process of improving schools. The first two were rated high in importance by teachers and the last pair only moderately important. Relating effectively to other teachers and participating in the process of improving schools were, in addition to ratings of lower importance, considered to be competency areas where learning by experience was required. In these two areas preservice preparation programs made only a limited contribution.

Fullan (1982) concluded "Initial teacher education, no matter how wonderful the program is, is severely limited in what it can do to prepare teachers to implement changes" (p. 262). If it is not feasible to develop the requisite skills, knowledge and attitudes during preservice this presents yet another set of objectives for those responsible for the inservice education of teachers.

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